Current flow and oxygen concentrations recorded by the 2OEC-instrument in the Florida Keys from August 2013 and April 2014

Website: https://www.bco-dmo.org/dataset/812523
Data Type: Cruise Results
Version: 1
Version Date: 2020-05-21

Project
» Collaborative Research: Robust optode-based eddy correlation systems for oxygen flux measurements in aquatic environments (Robust optode-based eddy correlation systems)

Contributors	Affiliation	Role
Huettel, Markus	Florida State University (FSU - EOAS)	Principal Investigator
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Abstract
Velocity and external sensor data recorded by the Nortek Vector ADV logger in the Florida Keys from August 2013 and April 2014.

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Coverage

Spatial Extent: **Lat**:24.72 **Lon**:-80.8308
Temporal Extent: 2013-08-14 - 2014-04-10

Dataset Description

Velocity and external sensor data recorded by the Nortek Vector ADV logger.
The eddy covariance instrument was deployed August 16-17, 2013 in a subtropical inner shelf environment (Salinity: 35-36, temperature: 30° ± 0.5°C) approximately 9 km south of Long Key in the Florida Keys (24° 43.52'N, 80° 49.85'W). The site was located at 9 ± 1 m water depth near the center of a large flat carbonate platform covered with coral sand. The measuring volume of the ADV was adjusted to be ~35 cm above the sediment-water interface.

Acquisition Description

The data are unprocessed raw data as recorded by the Nortek Vector ADV using the following settings:

Sampling rate	64 Hz
Nominal velocity range	0.30 m/s
Burst interval	CONTINUOUS
Samples per burst	N/A
Sampling volume	14.9 mm
Measurement load	59 %
Transmit length	4.0 mm
Receive length	0.01 m
Output sync	VECTOR
Analog output	DISABLED
Analog input 1	FAST
Analog input 2	FAST
Power output	DISABLED
Output format	VECTOR
Velocity scaling	0.1 mm
IMU mode	OFF
IMU data type	AHRSCC
Powerlevel	HIGH
Coordinate system	XYZ
Sound speed	MEASURED
Salinity	35.0 ppt
Distance between pings	1.01 m
Number of beams	3
Software version	1.37.02

The analysis of the data and their interpretation are reported in the submitted paper:

Technical note: Measurements and data analysis of sediment-water oxygen flux using a new dual-optode eddy covariance instrument by Markus Huettel, Peter Berg and Alireza Merikhi

Processing Description

Vector 1.39.06 (Nortek) software (for downloading the data from the Nortek Vector ADV)
ORIGIN 2017, Origin labs (for converting Vector data files into .cvs files)

BCO-DMO Processing Notes:

- Served raw data files.

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Data Files

File	Version
130814_Huettel filename: 130814_Huettel.dat (Octet Stream, 784.98 MB) MD5:d09c18ea860ffa20bc39503a9f2d2505 *Current flow and oxygen concentrations recorded by the 2OEC-instrument from August 14-15, 2013.* *Time of first measurement 14 Aug. 2013, 10:30:00* *Time of last measurement 15 Aug. 2013, 14:14:58* *Number of measurements 6,393,542* *Data file (data)* *Col# Parameter (Unit)* *1 Seconds (s)* *2 Day (Day in August 2013)* *3 Burst counter (counts)* *4 Ensemble counter (counts)* *5 Velocity (Beam1|X|East) (m/s)* *6 Velocity (Beam2|Y|North) (m/s)* *7 Velocity (Beam3|Z|Up) (m/s)* *8 Amplitude (Beam1) (counts)* *9 Amplitude (Beam2) (counts)* *10 Amplitude (Beam3) (counts)* *11 SNR (Beam1) (dB)* *12 SNR (Beam2) (dB)* *13 SNR (Beam3) (dB)* *14 Correlation (Beam1) (%)* *15 Correlation (Beam2) (%)* *16 Correlation (Beam3) (%)* *17 Pressure (dbar)* *18 Analog input 1 (counts)* *19 Analog input 2 (counts)* *20 Checksum (1=failed)* *Vector (Nortek)* *Accuracy: ± 0.5% of measured value ±1 mm/s* *Velocity precision: typ. 1% of velocity range (at 16 Hz)* *Oxygen sensor (Pyroscience)* *Accuracy* *at 5% a.s./0.44 mg/L ±0.1% a.s. ±0.01 mg/L* *at 95% a.s./8.8 mg/L ±1% a.s. ±0.1 mg/L* *Resolution* *at 5% a.s./0.44 mg/L 0.05% a.s. 0.005 mg/L* *at 95% a.s./8.8 mg/L 0.25% a.s. 0.025 mg/L* *Detection Limit 0.1% a.s. 0.01 mg/L*	1

File	Version
130816_Huettel filename: 130816_Huettel.dat (Octet Stream, 602.87 MB) MD5:2169def105b830570767e07d3e9efbb3 *Current flow and oxygen concentrations recorded by the 2OEC-instrument from August 16-17, 2013.* *Time of first measurement 16 Aug. 2013, 10:30:00* *Time of last measurement 17 Aug. 2013, 11:23:24* *Number of measurements 5,734,705* *Data file (data)* *Col# Parameter (Unit)* *1 Seconds (s)* *2 Day (Day in August 2013)* *3 Burst counter (counts)* *4 Ensemble counter (counts)* *5 Velocity (Beam1|X|East) (m/s)* *6 Velocity (Beam2|Y|North) (m/s)* *7 Velocity (Beam3|Z|Up) (m/s)* *8 Amplitude (Beam1) (counts)* *9 Amplitude (Beam2) (counts)* *10 Amplitude (Beam3) (counts)* *11 SNR (Beam1) (dB)* *12 SNR (Beam2) (dB)* *13 SNR (Beam3) (dB)* *14 Correlation (Beam1) (%)* *15 Correlation (Beam2) (%)* *16 Correlation (Beam3) (%)* *17 Pressure (dbar)* *18 Analog input 1 (counts)* *19 Analog input 2 (counts)* *20 Checksum (1=failed)* *Vector (Nortek)* *Accuracy: ± 0.5% of measured value ±1 mm/s* *Velocity precision: typ. 1% of velocity range (at 16 Hz)* *Oxygen sensor (Pyroscience)* *Accuracy* *at 5% a.s./0.44 mg/L ±0.1% a.s. ±0.01 mg/L* *at 95% a.s./8.8 mg/L ±1% a.s. ±0.1 mg/L* *Resolution* *at 5% a.s./0.44 mg/L 0.05% a.s. 0.005 mg/L* *at 95% a.s./8.8 mg/L 0.25% a.s. 0.025 mg/L* *Detection Limit 0.1% a.s. 0.01 mg/L*	1

File	Version
140410_Huettel filename: 140410_Huettel.dat (Octet Stream, 695.04 MB) MD5:842bc3cc25fb0990f8e3540ea299168d *Current flow and oxygen concentrations recorded by the 2OEC-instrument from April 10-11, 2014* *Time of first measurement 10 Apr. 2014, 10:00:00* *Time of last measurement 11 Apr. 2014, 14:32:42* *Number of measurements 6,576,690* *Data file (data)* *Col# Parameter (Unit)* *1 Seconds (s)* *2 Day (Day in April 2014)* *3 Burst counter (counts)* *4 Ensemble counter (counts)* *5 Velocity (Beam1|X|East) (m/s)* *6 Velocity (Beam2|Y|North) (m/s)* *7 Velocity (Beam3|Z|Up) (m/s)* *8 Amplitude (Beam1) (counts)* *9 Amplitude (Beam2) (counts)* *10 Amplitude (Beam3) (counts)* *11 SNR (Beam1) (dB)* *12 SNR (Beam2) (dB)* *13 SNR (Beam3) (dB)* *14 Correlation (Beam1) (%)* *15 Correlation (Beam2) (%)* *16 Correlation (Beam3) (%)* *17 Pressure (dbar)* *18 Analog input 1 (counts)* *19 Analog input 2 (counts)* *20 Checksum (1=failed)* *Vector (Nortek)* *Accuracy: ± 0.5% of measured value ±1 mm/s* *Velocity precision: typ. 1% of velocity range (at 16 Hz)* *Oxygen sensor (Pyroscience)* *Accuracy* *at 5% a.s./0.44 mg/L ±0.1% a.s. ±0.01 mg/L* *at 95% a.s./8.8 mg/L ±1% a.s. ±0.1 mg/L* *Resolution* *at 5% a.s./0.44 mg/L 0.05% a.s. 0.005 mg/L* *at 95% a.s./8.8 mg/L 0.25% a.s. 0.025 mg/L* *Detection Limit 0.1% a.s. 0.01 mg/L*	1

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	Nortek Vector ADV
Generic Instrument Name	Acoustic Doppler Velocimeter
Dataset-specific Description	Nortek Vector ADV, Serial number VEC 1436 Calibrations: The Nortek Vector ADV was factory-calibrated prior to the deployments The Pyrosience oxygen sensors were pre- and post calibrated using air saturated seawater (100% air saturation) and seawater with addition of sodium sulfite (0% air saturation).
Generic Instrument Description	ADV is the acronym for acoustic doppler velocimeter. The ADV is a remote-sensing, three-dimensional velocity sensor. Its operation is based on the Doppler shift effect. The sensor can be deployed either as a moored instrument or attached to a still structure near the seabed. Reference: G. Voulgaris and J. H. Trowbridge, 1998. Evaluation of the Acoustic Doppler Velocimeter (ADV) for Turbulence Measurements. J. Atmos. Oceanic Technol., 15, 272–289. doi: http://dx.doi.org/10.1175/1520-0426(1998)0152.0.CO;2

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Project Information

Collaborative Research: Robust optode-based eddy correlation systems for oxygen flux measurements in aquatic environments (Robust optode-based eddy correlation systems)

Website: http://myweb.fsu.edu/mhuettel/Projects/NSF_Instr.html

Coverage: Sand flat at ~10 m water depth in Florida Keys, 9 km south of Long Key (24° 43.52'N, 80° 49.85'W)

NSF Award Abstract: The PIs request funding to build and test robust eddy correlation instruments for unidirectional and oscillating flow environments based on sturdy fiber- and planar-optical sensors and novel signal-processing electronics. The new hardware will be supported by software development to correct potential flux underestimations caused by inadequate oxygen sensor response time and spatial offsets between oxygen and flow sensors. The fragility of the thin glass microelectrode used in aquatic eddy correlation instruments severely limits the use of this powerful technique for flux measurements in benthic environments. This problem represents the major bottleneck preventing the widespread use of this approach. Broader Impacts: The PIs have very strong records both in spreading the use of EC technology through the community and in graduate and undergraduate education. They outline clearly the ways in which they will continue their ongoing endeavors in both areas. In addition, the application of this technology to the geochemistry and ecology of shallow-water regions has broad implications for carbon cycling and ocean acidification studies, both of which have important societal ramifications. Better quantify oxygen fluxes in the aquatic environment is important for society. It can e.g. help predict when and if the health of an aquatic system is being weakened, and when e.g. hypoxia or anoxia is approaching. Anoxia leads to death of all higher life

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334117
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334848

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